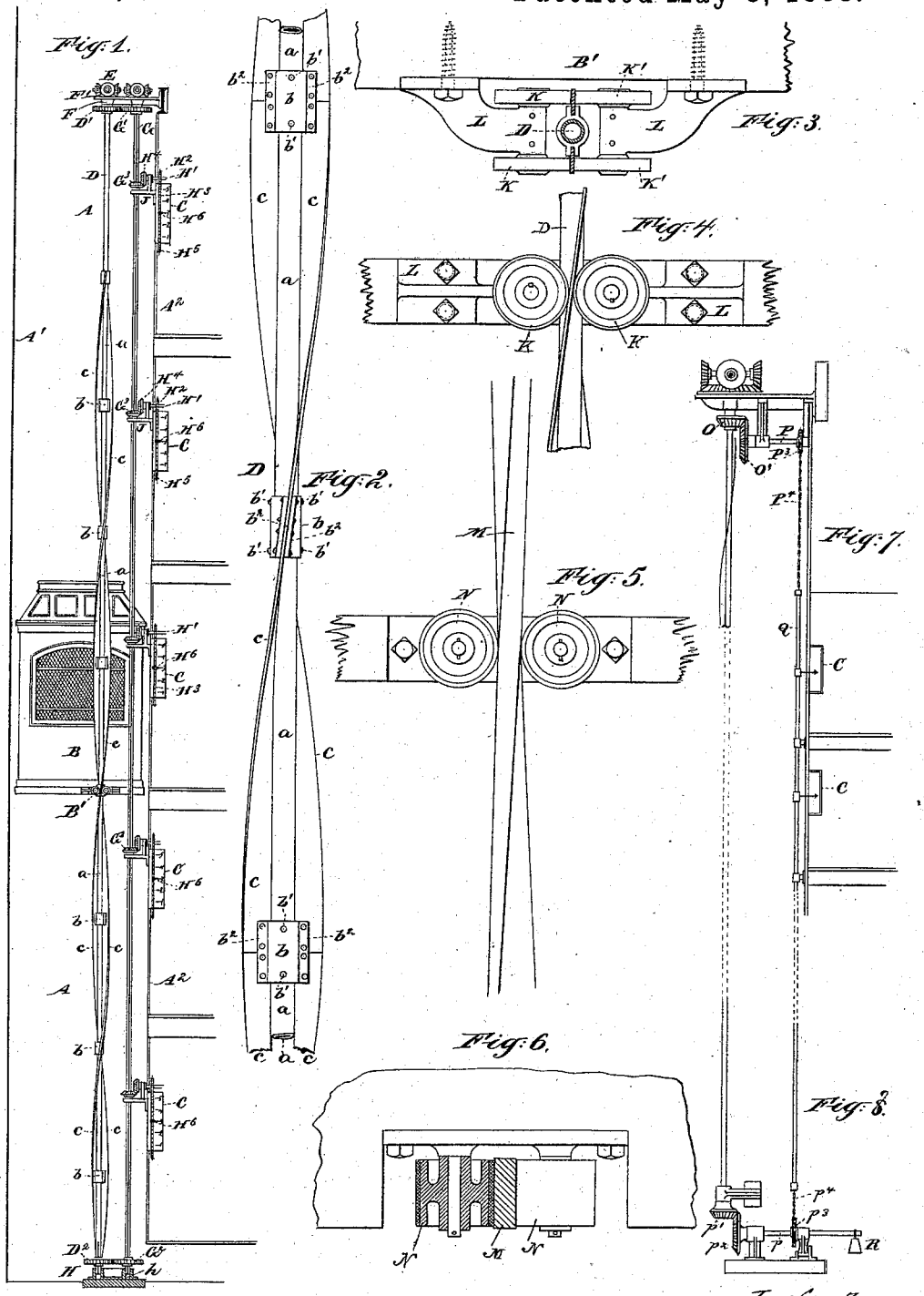
(No Model.)

# H. EICHBAUM.

## ELEVATOR INDICATOR.

No. 382,354. Patented May 8, 1888.

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# UNITED STATES PATENT OFFICE.

HENRY EICHBAUM, OF MOUNT VERNON, NEW YORK, ASSIGNOR TO HIMSELF, AND THE CRANE ELEVATOR COMPANY OF ILLINOIS, OF CHICAGO, ILLINOIS.

## ELEVATOR-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 382,354, dated May 8, 1888.

Application filed November 5, 1887. Serial No. 254,345. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY EICHBAUM, of Mount Vernon, in the county of Westchester and State of New York, have invented a certain new and useful Improvement in Elevator-Indicators, of which the following is a specification.

The importance of providing on the several floors of a building in which one or more elevators are used some means of indicating to the eye at a glance the fact that the elevator is above or below, and is ascending or descending, has long been recognized, and many devices have been introduced to attain this end.

My indicator mechanism receives its motion from the car itself, and thus avoids the objections made to those which register the motion of the steam-engine or hydraulic motor, which may not be in permanent unison with the car, and which is often situated at a distance from the elevator-hatchway, and being connected therewith by light wire ropes or other elastic connections, may lose that positiveness of indication which it is my aim to secure.

The distinguishing feature of my invention consists of an upright shaft situated in and extending the whole height of the hatchway close to the car. This shaft is either itself a quick screw, or has such a screw formed upon it, and as the car rises and falls it turns this screw-shaft slowly around by means of rollers attached to the car, which bear against the shaft, forming in fact a nut for the screw. The motion which the car thus imparts to the shaft is communicated to the indicators by suitable mechanism, as hereinafter described.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is an elevation in section of the elevator-hatchway, showing the car and the several floors of the building. The remaining figures, except Figs. 7 and 8, are on a larger scale. Fig. 2 is an elevation showing a short portion of the upright screw-shaft. Fig. 3 is a horizontal section through the same, showing the rollers on the car which engage with the screw. Fig. 4 is an elevation corresponding to Fig. 3. The remaining figures show modifications. Fig. 5 is an elevation; and Fig. 6 a corresponding horizontal section, partly in plan. Figs. 7 and 8 are elevations showing the mechanism in the upper and lower portions, respectively, of a high building. Fig. 7 is the upper part of the building, and Fig. 8 is the lower part.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

A A is the elevator-hatchway, A′ being the back wall and $A^2$ the front, in which the doors are situated that open upon the several floors of the building. Near each door is placed an indicator, which may, as shown, be an upright plate of glass or other material, marked with a vertical row of figures representing the floors, over which an index, which represents the car, moves as the car traverses from floor to floor.

B is the car, which, it will be understood, is raised and lowered in the hatchway. It may be a simple platform, as in some forms of freight-elevators, or have an inclosed cab or be of some special construction. Whatever its form or purpose my invention is applicable to it.

D is the vertical shaft. It extends the whole height of the hatchway, or at least so much of it as is occupied by the travel of the car, and is situated close to the car in that part of the hatchway called the "clearance," and which is left for the ropes, counter-weights, guides, &c., of the elevator.

The weight of the shaft D is sustained at the upper end by a set of anti-friction rollers, E, mounted on corresponding radial pins set in a hub securely fastened to the shaft at the top, and traversing on a correspondingly-conical track, F′, on a fixed bracket, F, which is properly secured to one or more of the beams of the building.

D′ is a spur gear-wheel fixed on the shaft immediately below the bracket F. It engages with a corresponding spur gear-wheel, G′, on a parallel vertical shaft, G, which is steadied laterally at each floor, and is also equipped with an anti-friction roller-bearing at the top, on which the entire weight is made to depend, the intention being that the rotary motion of the shaft D shall be communicated to the shaft

G with little friction, and with as little tendency as possible to produce torsion in the shaft D between the car, wherever it is situated, and the spur-wheel G′.

The lower ends of the shafts D and G are held in a double bearing, H. They are simply guided in the same, but do not rest upon it. Suitable clearance (marked *h*) is left in the bearings below the shafts, so that they may expand in length without any of their weight coming upon their lower ends, and also to allow for the settling of the building. The recess so left may be filled with oil. Immediately above the lower bearing, H, is situated on each shaft spur-wheels $D^2$ $G^2$, similar to those at the top. These lower spur-wheels should be loose on the shafts and have keyways and feathers for the communication of the rotary motion. The shafts may thus expand and contract without affecting the proper action of the gears. The shafts being thus connected at their upper and lower ends, will move in unison throughout, the amount of motion lost by torsion being too small to be appreciated in an apparatus of this character.

The shaft G is provided with beveled gear-wheels $G^3$ $G^3$, one at each floor, each of which engages with a beveled gear-wheel, $H^4$, on a shaft, H′, carrying a small chain-pulley, $H^2$, which operates on a small belt or chain, $H^3$, which runs over it, and is held extended by a chain-pulley, $H^5$, below. As the car rises and sinks, an index, $H^6$, upon this endless chain, travels up and down over the indicator C. The bevel gear-wheels $G^3$ are feathered on the shaft G, so that whatever the expansion or contraction or settling of the shaft G may be they will remain in proper position relatively to the bevel-gears H, which are mounted at each floor in brackets J J, which also serve to steady the shaft G.

The screw-shaft D may be made in many ways. It may be a square rod twisted into a quick screw in lengths riveted together. The rod also may be of other forms than square; but I prefer the following construction, both because it is lighter and more easily constructed and put together in the hatchway and offers the best face to the rollers which operate it. Its construction is shown in Fig. 2. *a a* are lengths of gas-pipe about eight feet in length. These are coupled together by long malleable-iron couplings *b b*, which are firmly screwed on the pipe and fastened with pins *b′ b′* to prevent their unscrewing. These couplings have cast upon them double flanges $b^2$ $b^2$, these being cast upon the body of the coupling at such an angle to the axis as corresponds to the thread of the screw to be applied upon the shaft. These flanges are on opposite sides of the couplings, so as to provide for two threads. The threads of the screw are formed of strips *c c* of iron, steel, or other metal, which are riveted between the flanges $b^2$ $b^2$ and project sufficiently beyond them to afford a bearing for the rollers, which, being carried on the car, act as a nut to turn the screw-shaft. When the shaft is put together these couplings *b b* are screwed on, so that the line of flanges on each is ninety degrees distant from that one next above or below. The metal strips, being bent either by hand or swaging to near the proper curve and fastened between the flanges $b^2$ $b^2$, will thus form a screw of thirty-two feet pitch, and this thread will be so nearly vertical that the action of the car-rollers upon it will have neither an upward lift nor a downward pull upon it, but will simply turn it one revolution for each thirty-two feet of rise or fall of the car.

The top and bottom of the shaft D, I propose to make of a short length of solid iron, the better to receive the spur-gears, and at the top the hub of the anti-friction roller-bearing. To this it might be well to attach one or two lengths, of eight feet each, of heavy gas-pipe at each end, the rest being of ordinary gas-pipe. Considering the very small amount of work this shaft has to do and the easiness of its motion, free from sudden jerks and strains, I consider one-inch gas-pipe to be of sufficient size. The external diameter of this is one and five-sixteenths, and that of the coupling one and three-fourths inch. Flanges one-half inch in width and projection of thread five-eighths inch farther on each side makes the whole width across four inches. For buildings not over six stories in height, three quarter piping would be sufficient.

The roller-nut upon the car is shown in Fig. 1 at B′, and is shown in plan and elevation on a large scale in Figs. 3 and 4. There are four rollers, K K K′ K′, in pairs, placed in a casting, L, in such positions that they embrace the thread of the shaft D. This casting L is fixed to the car, preferably, upon the edge of the platform, as shown, in such a position as to have the rollers take the shaft D when in its natural vertical position. The rollers themselves are made of iron or brass; but their edges are faced with soft rubber or other like material—as leather or paper—so that their rolling upon the screw shall be noiseless. The action of this roller-nut upon the shaft D is obvious. As the car passes up or down, the rollers keep the thread parallel to their bearing-surfaces, and to accommodate itself to this action the shaft will be gently and slowly turned.

It is obvious that for the purpose of approximately indicating the position or progress of an elevator-car no great uniformity of motion is required. It is therefore not necessary that the strips of iron forming the thread of the screw should form a true thread, especially as the indicators would be marked after the apparatus was erected, and then from the actual position of the car itself. The apparatus would then never need adjustment, for all the motions are positive.

For a cheaper construction, and especially where there might not be room for such a screw-shaft as I have described, I propose the arrangement shown in Figs. 5 and 6. M is an iron bar about one-half inch by one and one-

half inch, which is twisted cold to the proper twist—say each length of sixteen feet twisted half around. A sufficient number of these bars would be fastened together by scarfing and riveting the ends to form a tread for the rollers equal in length to the travel of the car. The rest of the shaft might be made of gas-pipe and round iron. This shaft may be let into the edge of the platform of the elevator-car, and two rubber-faced rollers, N N, on a suitable casting, so placed as to bear on the wide surfaces of the bar, would give it the same motion that the shaft D in Fig. 1 has.

It is not necessary to have the associate shaft G in order to take advantage of the rotary motion of the shaft D. The spur-gears D′ G′ may be replaced by a pair of bevel-gears, as shown in Fig. 7, marked O O′, O′ being on a short horizontal shaft, P, supported on suitable bearings. $P^3$ is a chain-wheel carrying a short length of chain, $P^4$, to the lower end of which is fastened a light brass tube, Q, guided at each floor and carrying upon it the indexes of the indicator. This would be a cheap arrangement, and suitable for buildings of five or six stories; but when the car was at the bottom of the hatchway the indexes would be affected by the whole torsion of the screw-shaft, which would have to be completely reversed on going up. This could be remedied by placing another pair of bevel-wheels at the foot of the shaft, with another horizontal shaft having upon it a chain-wheel similar to that on the top. (Shown in Fig. 7.) This arrangement is shown in Fig. 8, and in connection by dotted lines with Fig. 7. Here the lower horizontal shaft is marked *p* and the bevel-wheels $p'$ $p^2$, the lower chain-wheel, $p^3$, and the chain upon it $p^4$. In this case the chain must be connected on both sides of the chain-wheels $P^3$ $p^3$, and the chain and its connecting-rods kept taut by a weight, R. In this arrangement the torsion of the screw-shaft would practically disappear, the same as with the associate shaft G in Fig. 1.

I propose to insert transverse pins through the couplings to insure against unscrewing when in use.

Other modifications may be made without departing from the principle or sacrificing the advantages of the invention. Parts of the invention can be used without the whole. I can use a screw-shaft constructed otherwise than in the manner shown, and by properly engaging with it turn it as the car moves up and down, and thereby give a reliable positive motion to the several indices $H^6$.

In an elevator-shaft where very little room exists between the side of the car and the inclosing-walls it may be necessary to use a different form of shaft, say a square rod which may run in a long square sleeve. This might be in a recess in the edge of the platform, which usually projects an inch or two beyond the car; or the rod may be flat and twisted and have rollers in the edge of the car bearing on the opposite flat sides.

I claim as my invention—

1. The combination, with an elevator platform or car, B, of a vertical screw-shaft, D, and mechanical connections therefrom to the several indices $H^6$, working on suitable scales, the car being fitted with means, as the rollers N N, to act on and turn the screw-shaft and its connections as it ascends and descends, substantially as herein specified.

2. In an elevator-indicator, the upright shaft D, simply guided at the bottom, in combination with anti-friction rollers E, supporting its weight at or near the top, the associated shaft G, gearing $G^3$ $H^4$, and with the car B, provided with rollers N N, and indicator-index $H^6$, arranged for joint operation, as herein specified.

3. In an elevator-indicator, in combination with the car B and rollers N N, carried thereon, the shaft D, made in sections, united by couplings *b b*, and the helical flanges $b^2$ $b^2$, the latter being riveted or otherwise secured to the couplings in the required helical positions, substantially as herein specified.

In testimony whereof I have hereunto set my hand, at New York city, New York, this 13th day of October, 1887, in the presence of two subscribing witnesses.

HENRY EICHBAUM.

Witnesses:
H. A. JOHNSTONE,
M. F. BOYLE.